FREEDOM WATER AND SEWER DISTRICT
WATER SUPPLY SYSTEM

A part of the

STAR VALLEY LEVEL II STUDY

for

Wyoming Water Development Commission

Sponsored by

Lincoln County, Wyoming

THE STATE
OF WYOMING

Executive Summary

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STAR VALLEY LEVEL II STUDY
EXECUTIVE SUMMARY

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FIGURE 1.1

LOCATION MAP

PROJECT LOCATION

FREEDOM
AFTON

LARAMIE
CHEYENNE

GREEN RIVER
EVANSTON

UTAH
COLORADO

MONTANA
SOUTH DAKOTA
NEBRASKA

IDAH0

90
26
90
812
16
25
30
30
130
150
44
89
189
191
80
"legg Fe RSG R EN
ASSOCIATES/P.A.

FORSGREEN
ASSOCIATES/P.A.
SECTION 1.0
INTRODUCTION

EXECUTIVE SUMMARY

1.1 PROJECT OVERVIEW AND HISTORY

The Star Valley area, in Western Wyoming, can be characterized as a rural agricultural area. Most Star Valley communities are presently unincorporated and have no political jurisdiction or authority. Because of that fact, the residents of many areas formed independent Pipeline Companies to provide drinking water to their communities. These pipeline companies developed community water supply and distribution systems most of which, are 40-50 years old. These pipeline systems typically consist of many miles of small diameter steel and galvanized iron pipe to serve large rural areas. Although the pipeline companies have generally been diligent in fixing leaks and performing normal maintenance operations, most of the systems have not significantly changed since their initial construction.

As these rural communities have grown and water use habits have changed, the pipelines have experienced increasing demands along with pipeline tuberculation and loss of system efficiency. Low (or negative) pressures are an increasing problem. Lines are aging and leakage is becoming more common. The alluvial soils of the area make both small and large leaks difficult to detect. Many pipeline companies, including Freedom, have placed a moratorium on new connections, thereby forcing new residents to rely on individual wells. These individual wells vary widely in reliability and quality even within close proximity to each other.

Over the past several years, the Environmental Protection Agency has noted water quality problems with many of these systems. Microbiological contamination has been the most evident concern. This contamination is generally a result of the low pressures, leaking lines, unprotected sources, etc. EPA considers nearly all of the systems "at risk" due to the lack of disinfection capabilities.

In 1987 and 1988, several Star Valley pipeline companies, including the Freedom Pipeline Company, were given Administrative Orders by EPA to comply with EPA's MCL (Maximum Contaminant Level) Standards. Each of these orders mandated that a professional engineer be hired to examine the system and submit plans for EPA compliance. This Level II study is largely in response to those EPA mandates. EPA has acknowledged the potential benefits of the WWDC Level I and Level II studies, and has shown a willingness to delay further action to allow for implementation of Level II recommendations.

This report is intended to discuss the issues, recommendations, and conclusions of the Star Valley Municipal Water Supply Level II investigation specifically as they relate to the Community of Freedom, Wyoming.

1.2 STUDY OBJECTIVES

The objective of this study as expressed in the initial request for proposals is "to determine the technical and economic feasibility of rehabilitating and enlarging the water supply systems" for the six Star Valley Communities discussed above. The initial Level II investigation was conducted in three phases as follows:
Phase I: Water System Evaluation and Groundwater Geohydrologic Analysis: This phase involved the continued documentation of existing source water quality and yields. Specific water usage was measured for each respective Star Valley community and actual water needs verified. Also included in this phase was an analysis of water rights, and the feasibility of increasing available water from existing or new spring sources. A geohydrologic study of the entire Star Valley area to determine the "preferred" location for a primary or supplemental groundwater well for each of the six respective communities was also completed as part of Phase I.

Phase II: Well Construction and Aquifer Testing: Based on the Phase I investigation, three test wells were planned for the communities of Fairview, Freedom, and Smoot respectively. This phase included the actual design, bidding, construction and testing of the three wells.

Phase III: Conceptual Design and Cost Estimates: Based on the Phase I and II findings, and on input from area residents, conceptual designs and cost estimates were generated. This phase involved computer modeling each system, cost estimates, the determination of probable funding, rate impact calculations, etc. Phase III work also included a resident questionnaire to obtain and document local opinions relative to water needs, fire protection, willingness to pay, and the overall level of interest and support by the community.

In June of 1992, Forsgren Associates' contract was amended to include the following phases:

Phase IV: Second Freedom Test Well Construction and Testing: The Freedom test well constructed in phase II was found to be unsuitable for domestic use. A second test well, therefore, was located and constructed in the fall of this year. Preliminary test results indicate that second well will be able to meet the needs of the community.

Phase V: Revised Conceptual Design and Cost (Freedom): The conceptual design and cost estimate was revised to reflect the location and results of the second Freedom test well. This report documents the selected design alternative, cost estimates, etc. for Freedom's water supply improvements.

1.3 Existing Water Quality

The community of Freedom presently relies on a single groundwater well. The well is relatively shallow (30-60 feet deep) and is centrally located in the developed town-site.

Water quality testing performed as part of this study indicates the well is capable of producing good quality drinking water. However, there is concern about the shallow well depth and potential contamination due to flooding and/or man made pollution. The well is also considered to be "at risk" by the EPA due to the lack of any disinfection capability in the system.

Severe bacteriological contamination problems are becoming increasingly evident in the system. These problems may be the result of deteriorated piping, periodic low-system pressures, and/or
direct contamination of the well. Another Administrative Order was issued in May of 1992 advising that Freedom residents boil their drinking water. That order is still in effect.

1.4 WATER SUPPLY NEEDS

The present and future water supply needs for the community of Freedom are summarized in Table 1.1. Present demands are based on measured water usage and are comparable to surrounding Star Valley communities. Future projections assume a 30-year, 1% annual population growth. Given Star Valley’s (and Freedom’s) relatively high per-capita water consumption, future projections were reduced by 25% to reflect a fully "metered" water system.

Freedom’s existing well pumping capacity was measured at 240 gpm. As indicated above, however, that source is not acceptable from a water quality standpoint.

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**TABLE 1.1**

**FREEDOM WATER SUPPLY NEEDS**

**NUMBER OF CONNECTIONS:**  
34 Existing Connections  
90 Existing Homes  
60 Immediate "Probable" Connections  
121 Future Connections (30 - year, 1% growth)

**WATER SUPPLY NEEDS:**  
*(Based on Star Valley Averages)*

<table>
<thead>
<tr>
<th></th>
<th>EXISTING UNMETERED</th>
<th>FUTURE METERED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(34 CONN.)</td>
<td>(121 CONN.)</td>
</tr>
<tr>
<td>Winter Day</td>
<td>3.10 gpm/conn</td>
<td>2.33 gpm/conn</td>
</tr>
<tr>
<td></td>
<td>105 gpm</td>
<td>282 gpm</td>
</tr>
<tr>
<td>Average Day</td>
<td>3.33</td>
<td>2.50</td>
</tr>
<tr>
<td></td>
<td>114 gpm</td>
<td>303 gpm</td>
</tr>
<tr>
<td>Peak Day</td>
<td>4.20</td>
<td>3.15</td>
</tr>
<tr>
<td></td>
<td>143 gpm</td>
<td>381 gpm</td>
</tr>
<tr>
<td>Peak Hour</td>
<td>4.60</td>
<td>3.68</td>
</tr>
<tr>
<td></td>
<td>157 gpm</td>
<td>445 gpm</td>
</tr>
</tbody>
</table>

1.5 WATER RIGHTS

The Freedom Pipeline Company presently holds a groundwater right for 300 gpm with priority of September, 1955. We are aware of no conflicts relative to that right. Of course, additional source development and system expansion will require new water rights filings.
1.6 RECOMMENDED SYSTEM IMPROVEMENTS

The community of Freedom has serious water supply, transmission, and distribution problems. Not only are they under mandate from EPA to improve their water quality, but their system has marginal capacity and poor reliability.

Extensive renovation and replacement work is recommended for the Freedom water system to meet their long term needs as follows:

1.6.1 Supply, Storage, and Transmission Improvements (WWDC funded)

The following specific improvements are recommended. These items are discussed in detail in the body of the Level II report.

a) Source of Supply - A new well has been sited and tested as part of the Level II Study. Recommended well capacity is between 380 gpm (peak day) and 580 gpm (to fill tank over 24 hours). The existing well will be abandoned.

b) Storage - A 400,000 gallon partially buried concrete tank is recommended for peaking, back-up, and fire protection.

c) Transmission Lines - Virtually all transmission lines should be replaced due to their restrictive sizing and advanced deterioration. Additional piping (approximately 2 miles of 10-inch pipeline) will be required from the well site to town.

d) Telemetry and Control - It is recommended that the new well be automated based on tank levels. This will result in efficient pump operations and minimize the potential for inadvertently draining the tank.

e) Disinfection - It is probable that EPA will mandate disinfection in the near future. Regardless of regulatory requirements, however, disinfection capability is felt to be necessary precaution for the town's single water supply source. A simple hypo-chlorite system is recommended because of its low capital investment and simplified operational concerns.

1.6.2 Distribution System Requirements

Recommended "distribution" related improvements are not eligible for WWDC funding. They are discussed herein for completeness of this report.

a) Distribution Pipelines - Looping lines and those pipes less than 6-inches in diameter were viewed as distribution lines for the purposes of this study.

b) Service Connections - Service connections will typically include 3/4-inch copper pipe from the mainline to the users property line. Also included are the service saddle, corp-stop, and meter box. The installation and use of meters will be a condition of Wyoming Farm Loan Board and FmHA funding participation.
1.7 PROJECT BUDGET

Recommended Budgets for WWDC eligible and non-WWDC eligible project elements are summarized in Tables 1.2 and 1.3 respectively.

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**TABLE 1.2**

Recommended Project Budget  
**Freedom Water Supply System Improvements**  
**WWDC Eligible Costs**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Est. Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mainline Transmission</td>
<td>$436,400</td>
</tr>
<tr>
<td>2</td>
<td>Storage Reservoir</td>
<td>$191,000</td>
</tr>
<tr>
<td>3</td>
<td>Well &amp; Appurtenances</td>
<td>$153,200</td>
</tr>
<tr>
<td>4</td>
<td>Miscellaneous</td>
<td>$12,000</td>
</tr>
</tbody>
</table>

Subtotal: $792,600

Preparation of Plans and Specs: $75,300  
Permitting & Mitigation: $6,500  
Legal Fees: $4,500  
R.O.W. Acquisition: $6,000

Construction Cost (from above): $792,600  
Construction Engineering (10%): 79,300  
Subtotal: $871,900

Contingency (15%): 130,800

Construction Total: $1,002,700  
PROJECT TOTAL: $1,095,000
### TABLE 1.3

**Recommended Project Budget**  
**Freedom Water Supply System Improvements**  
**Non-WWDC Eligible Costs**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Est. Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mainline Piping</td>
<td>$134,200</td>
</tr>
<tr>
<td>2</td>
<td>Service Line Construction</td>
<td>$ 83,300</td>
</tr>
</tbody>
</table>

**Subtotal**                                       $217,500

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of Plans and Specs</td>
<td>$ 26,100</td>
</tr>
<tr>
<td>Permitting &amp; Mitigation</td>
<td>$  1,500</td>
</tr>
<tr>
<td>Legal Fees</td>
<td>$  4,500</td>
</tr>
<tr>
<td>R.O.W. Acquisition</td>
<td>$  0</td>
</tr>
</tbody>
</table>

**Construction Cost (from above)** $217,500

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Engineering (10%)</td>
<td>21,700</td>
</tr>
<tr>
<td>Contingency (10%)</td>
<td>21,700</td>
</tr>
</tbody>
</table>

**Construction Total** $260,900

**PROJECT TOTAL** $293,000

### 1.8 PROBABLE PROJECT FINANCING

"Probable" financing for recommended system improvements is based on direct discussions with FmHA, Wyoming Farm Loan Board, and WWDC staff. It is based on the following participation levels from each respective agency:

A. **Transmission and Supply:** Based on past experience, it is proposed that WWDC will provide grant funding for 67% of the cost of eligible transmission and supply related improvements. The remaining 33% will be funded by a grant/loan mix from Farmers Home Administration (FmHA). The FmHA loan amount would be based on resident’s mean income. Recent funding experience with the Smoot Water System Funding application would indicate a monthly user loan payment to FmHA of approximately $10/connection/month.

B. **Distribution and Services:** The community of Freedom rests on the Wyoming - Idaho border. The town site is located on the Wyoming side. It is presumed that "Idaho" distribution related improvements will be funded 100% by an FmHA grant.
Wyoming Farm Loan Board is obviously not viewed as a viable option for Idaho distribution and service line funding. Wyoming Farm Loan Board funding is, however, a good possibility of "in-state" distribution piping and services. Based on past experience, it would be reasonable to request 50% Farm Loan Board grant funding for this "in-state" work. The remaining 50% would be funded by FmHA as part of their grant-loan financing package.

The proposed project financing scenario is summarized in Table 1.4.

---

**TABLE 1.4**

*Proposed Project Funding*

*Freedom Water System Improvements*

<table>
<thead>
<tr>
<th></th>
<th>Transmission and Supply</th>
<th>Idaho Distribution and Services</th>
<th>Wyoming Distribution and Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>WWDC Grant</td>
<td>$733,700</td>
<td>-0-</td>
<td>-0-</td>
</tr>
<tr>
<td>WWDC Loan</td>
<td>-0-</td>
<td>-0-</td>
<td>-0-</td>
</tr>
<tr>
<td>Farm Loan Board Grant</td>
<td>-0-</td>
<td>-0-</td>
<td>$108,650</td>
</tr>
<tr>
<td>Farm Loan Board Loan</td>
<td>-0-</td>
<td>-0-</td>
<td>-0-</td>
</tr>
<tr>
<td>FmHA Grant</td>
<td>$262,250</td>
<td>$75,700</td>
<td>$108,650</td>
</tr>
<tr>
<td><em>FmHA Loan</em></td>
<td>$99,100</td>
<td>-0-</td>
<td>-0-</td>
</tr>
<tr>
<td>(30 year, 6%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>$1,095,000</td>
<td>$75,700</td>
<td>$217,300</td>
</tr>
</tbody>
</table>

*FmHA loan payments based on 60 "probable" immediate connections x $10/month/connection = $7,200/year.*

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**1.9 PROJECT AVERAGE USER RATES**

Projected user rates could vary depending on the actual number of rate payers. That is because some costs, such as water quality testing and district audits remain constant regardless of the number of users. Based on discussion with the Freedom Board and the questionnaires received from area residents, we would anticipate approximately 60 "probable immediate" connections to the system. Table 1.5, therefore, shows a range of projected rates for 50, 60 and 70 users respectively.
TABLE 1.5
Projected Rate Impact
Freedom Water System Improvements

<table>
<thead>
<tr>
<th>Expense</th>
<th>No. of Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50 conn</td>
</tr>
<tr>
<td>FmHA Loan Payment</td>
<td>$10.00</td>
</tr>
<tr>
<td>Power(1)</td>
<td>4.45</td>
</tr>
<tr>
<td>O&amp;M(2)</td>
<td>11.85</td>
</tr>
<tr>
<td>Reserve(3)</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Total Rate</strong></td>
<td><strong>$27.30/Mo.</strong></td>
</tr>
</tbody>
</table>

Notes:
(1) Power costs based on average 2.5 gpm/connection, 5½¢/kWh.
(2) Estimated District O&M = $7,100/year.
(3) Reserve calculated as 10% of loan payment.
(4) Possible rate reduction associated with connection fees are not reflected herein.